

Developments in the DMCii Constellation & annual Tropical forest monitoring

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The DMC Concept

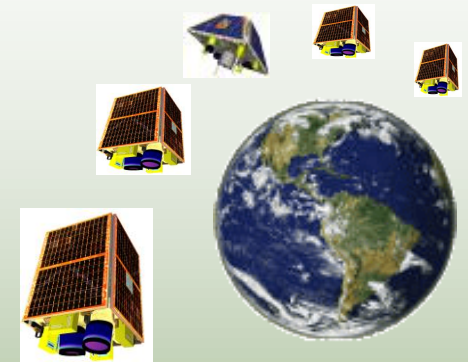
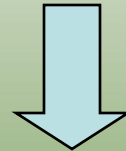
A Unique International Partnership Combining National Objectives, Humanitarian Aid and Commerce...



The Consortium



The Coordinator



The Constellation



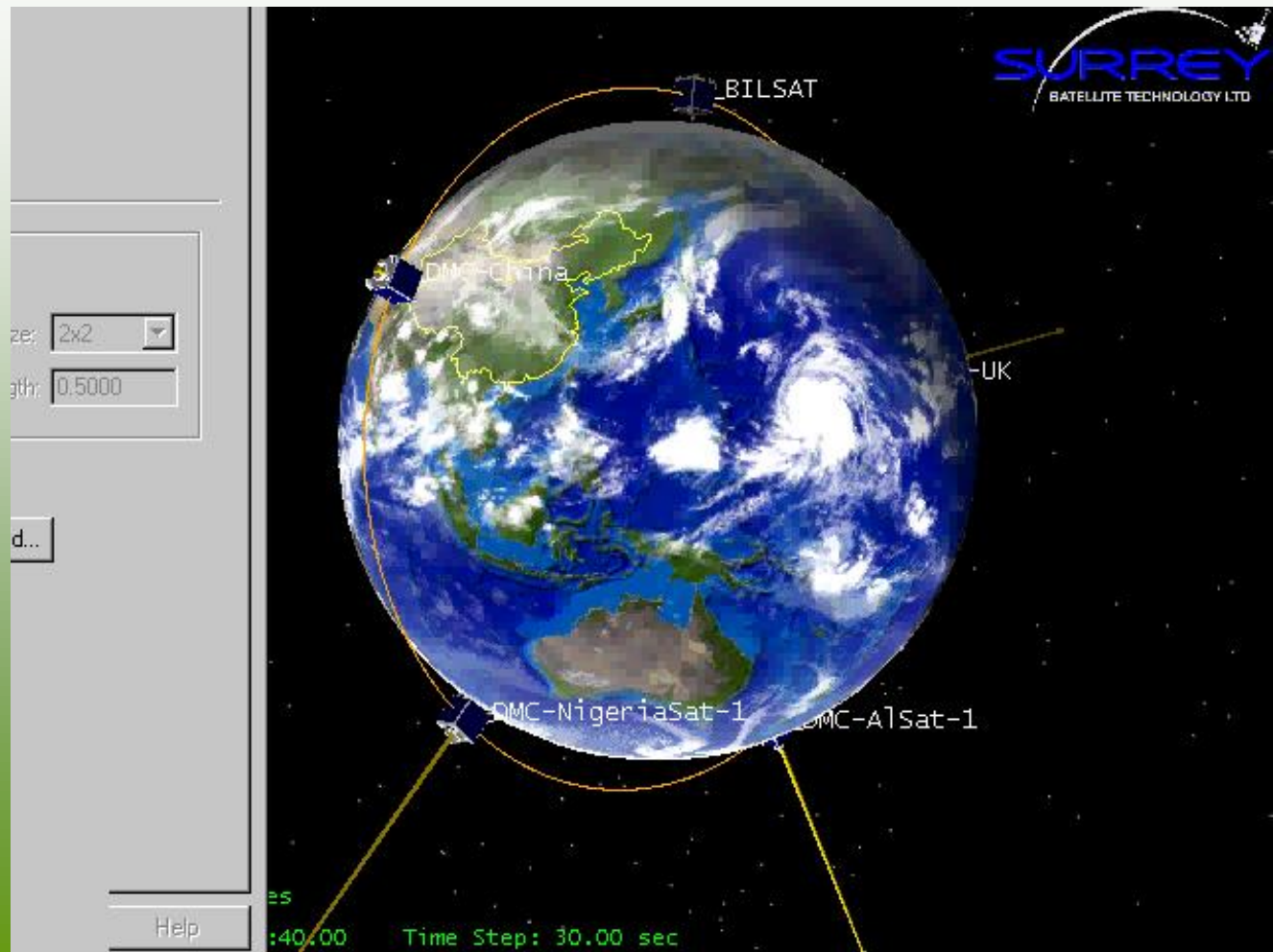
Applications;
Commercial, Government and Humanitarian

DMC Satellite Constellation

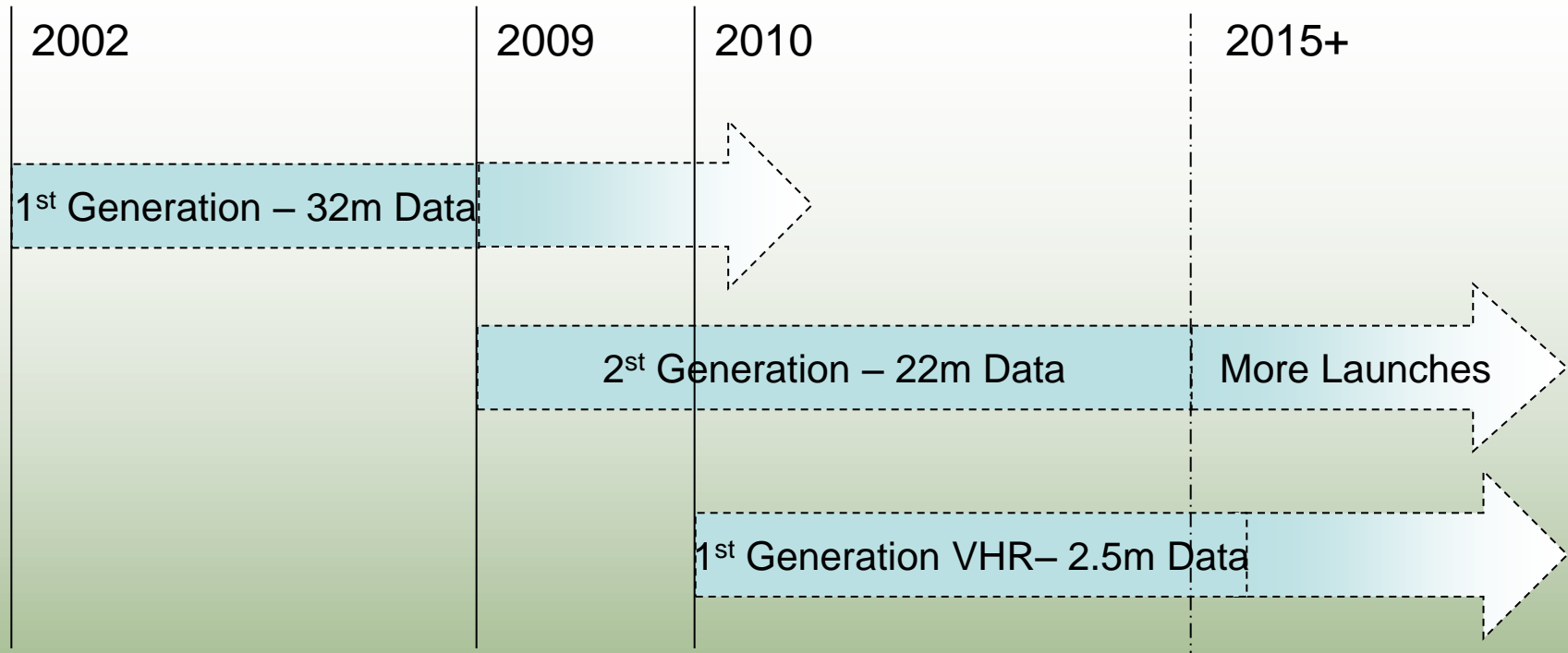
Designed for Global Daily Imaging

- High Resolution
32 & 22 m gsd
- Broad Swath
650+km
- Landsat
Compatible
Bands
 - Red
 - Green
 - NIR

Coverage Overlap
on Consecutive
passes



Satellite Constellation Sustainability Principles

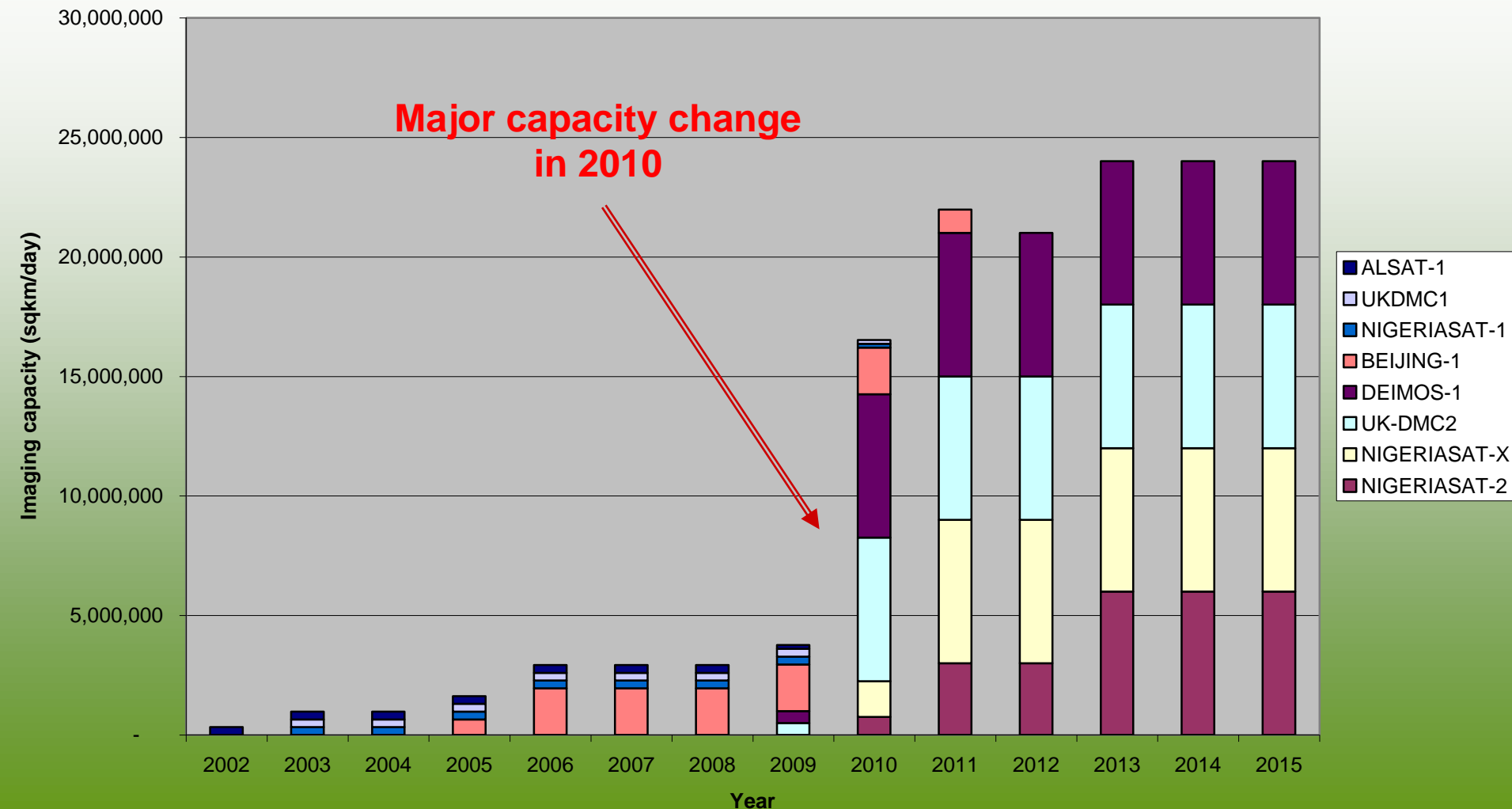


Cost effective SSTL satellites, and self-sustaining funding principles of commercial organisations delivers data continuity

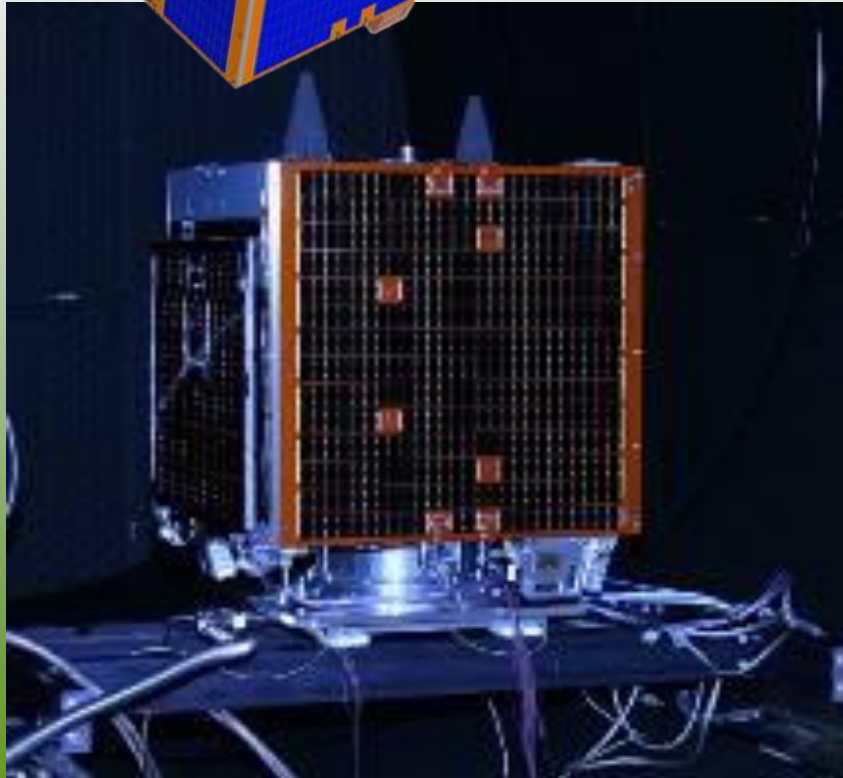
Consistent design principles delivers imagery consistency

DMCii Imaging Capacity

DMC daily imaging capacity



New Generation DMC Satellites

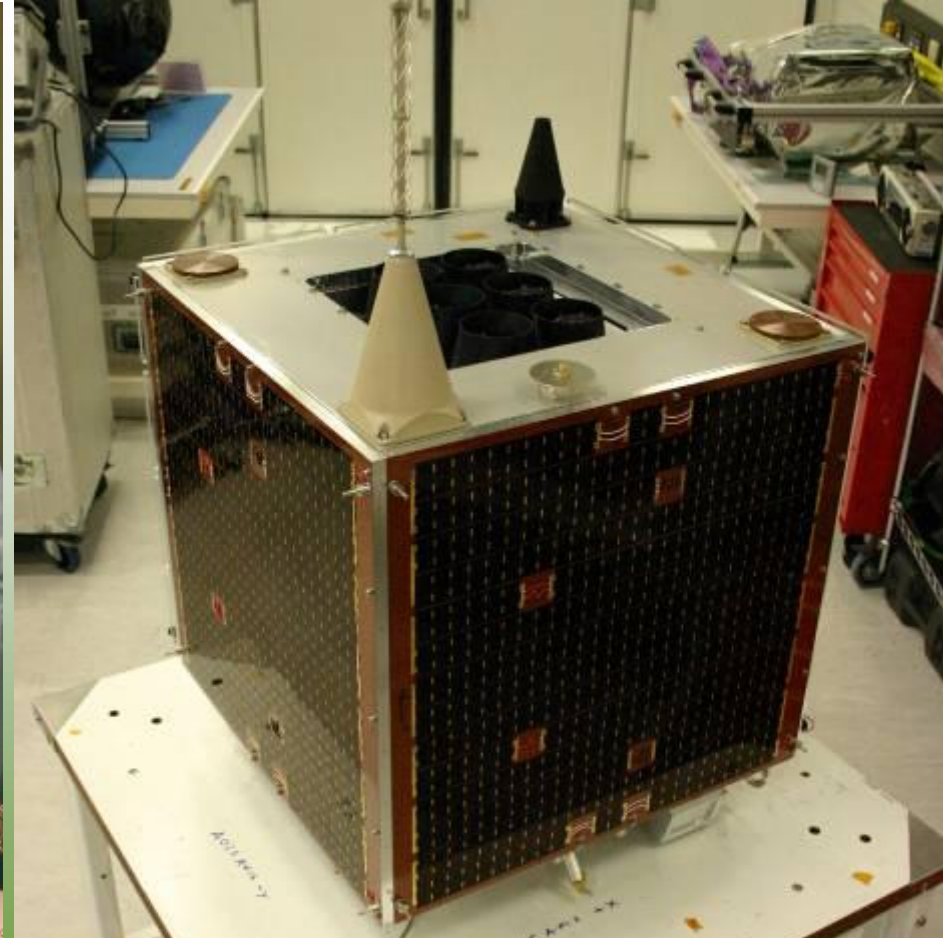


UK-DMC2 & Deimos-1

- 22m GSD
- R,G, NIR bands
- Landsat spec band-pass filter
- 10 bit
- 650km swath
- 1,350km strip as standard
- 8/20/40/80 Mb Downlinks
- Direct Broadcast Mode
- 5 day revisit for single DMC satellite
& Daily revisit in DMC constellation
- 2 Season Global Monitoring Capacity

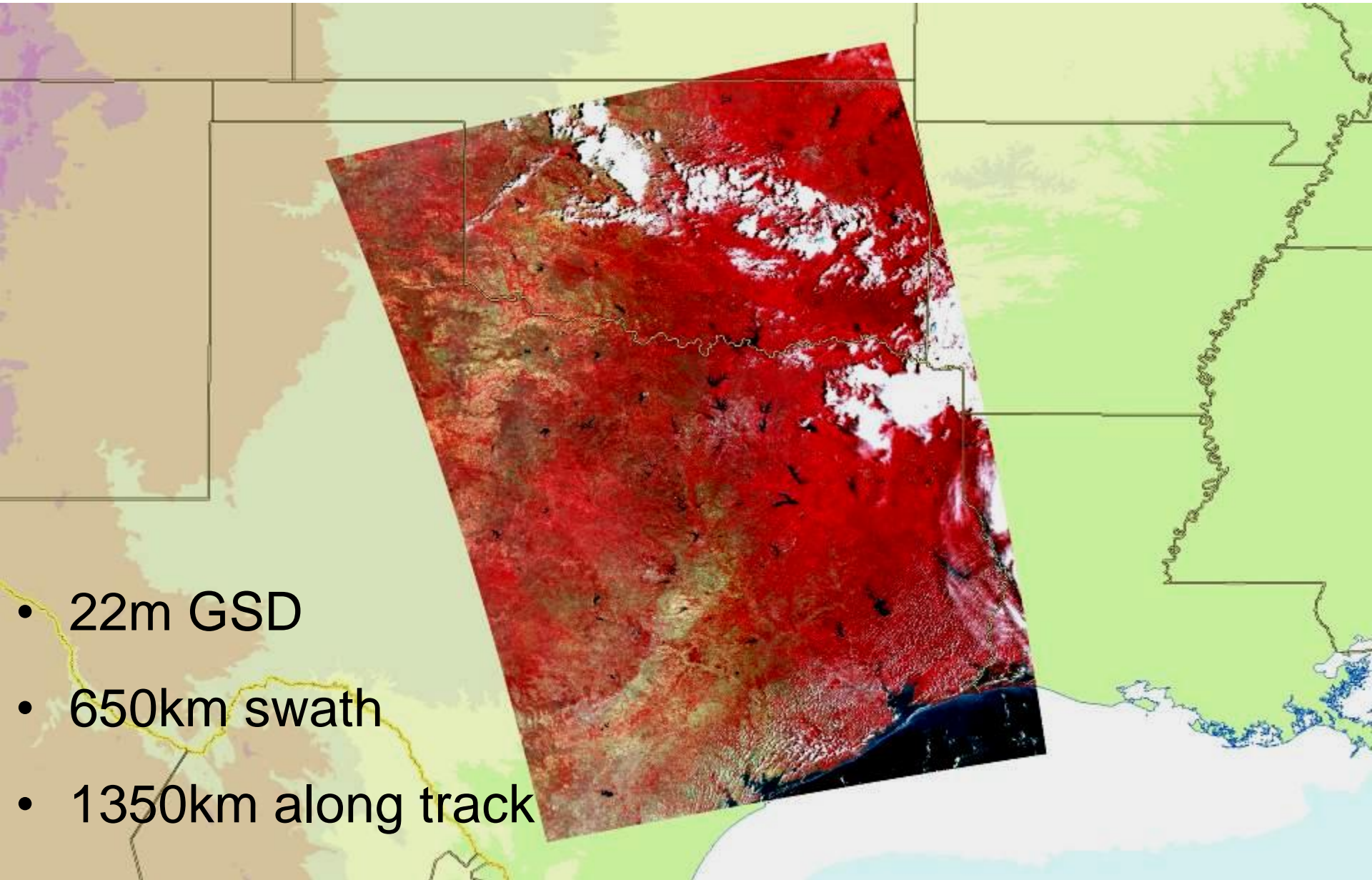
New 22-metre optical satellites

UK-DMC-2, Deimos-1, NigeriaSat-x



UK-DMC-2 & Deimos-1
Launched 29th July 2009

UK-DMC2 image - Texas



- 22m GSD
- 650km swath
- 1350km along track



Dallas (Fort Worth) Airport, UK-DMC2 Image (3 band) © DMCii

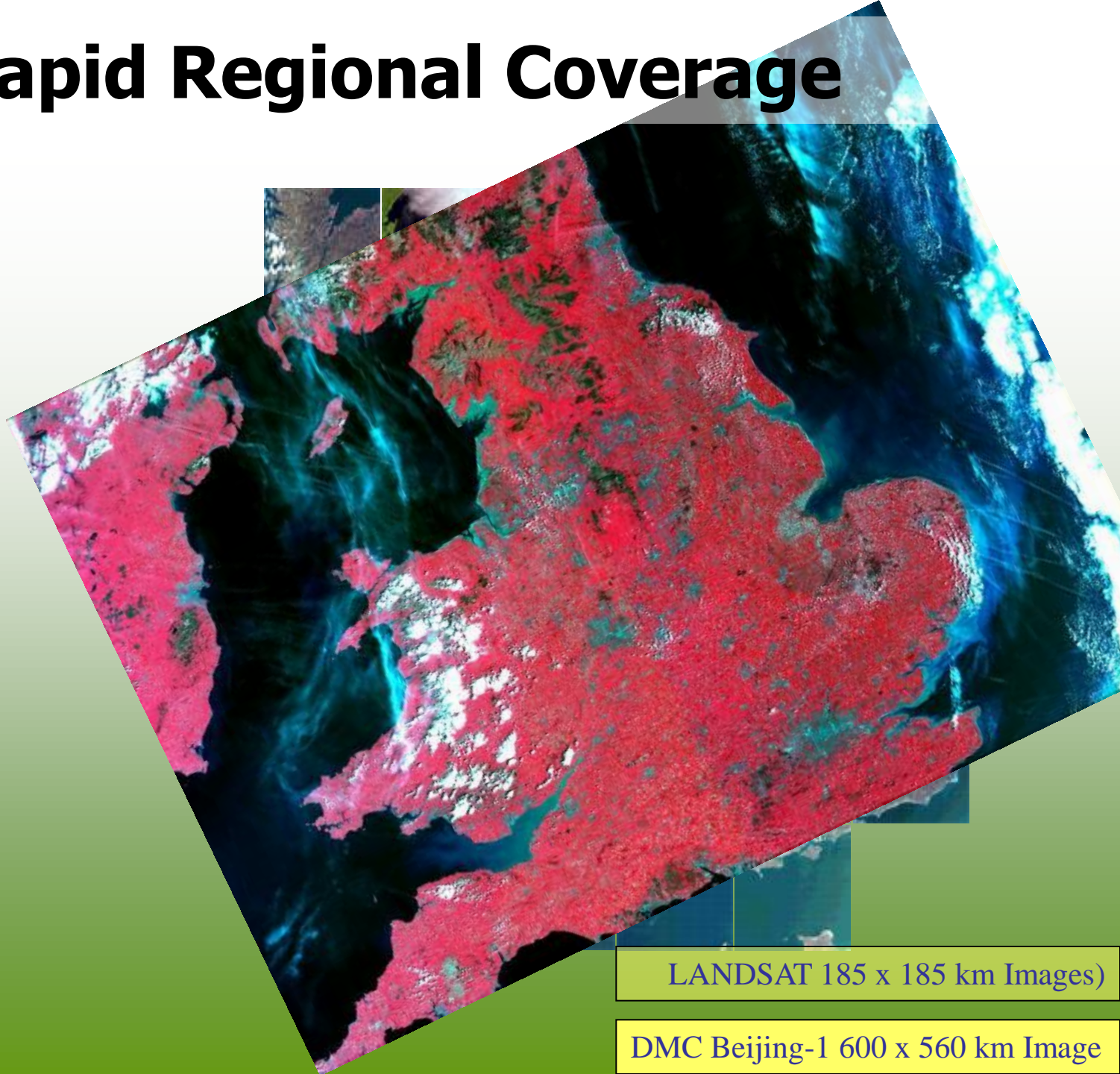
Rapid Regional Coverage

satellites



Resolution

32 & 22 m

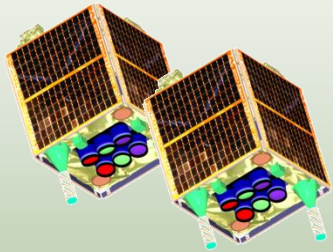


LANDSAT 185 x 185 km Images)

DMC Beijing-1 600 x 560 km Image

Rapid Continental Coverage

Satellites

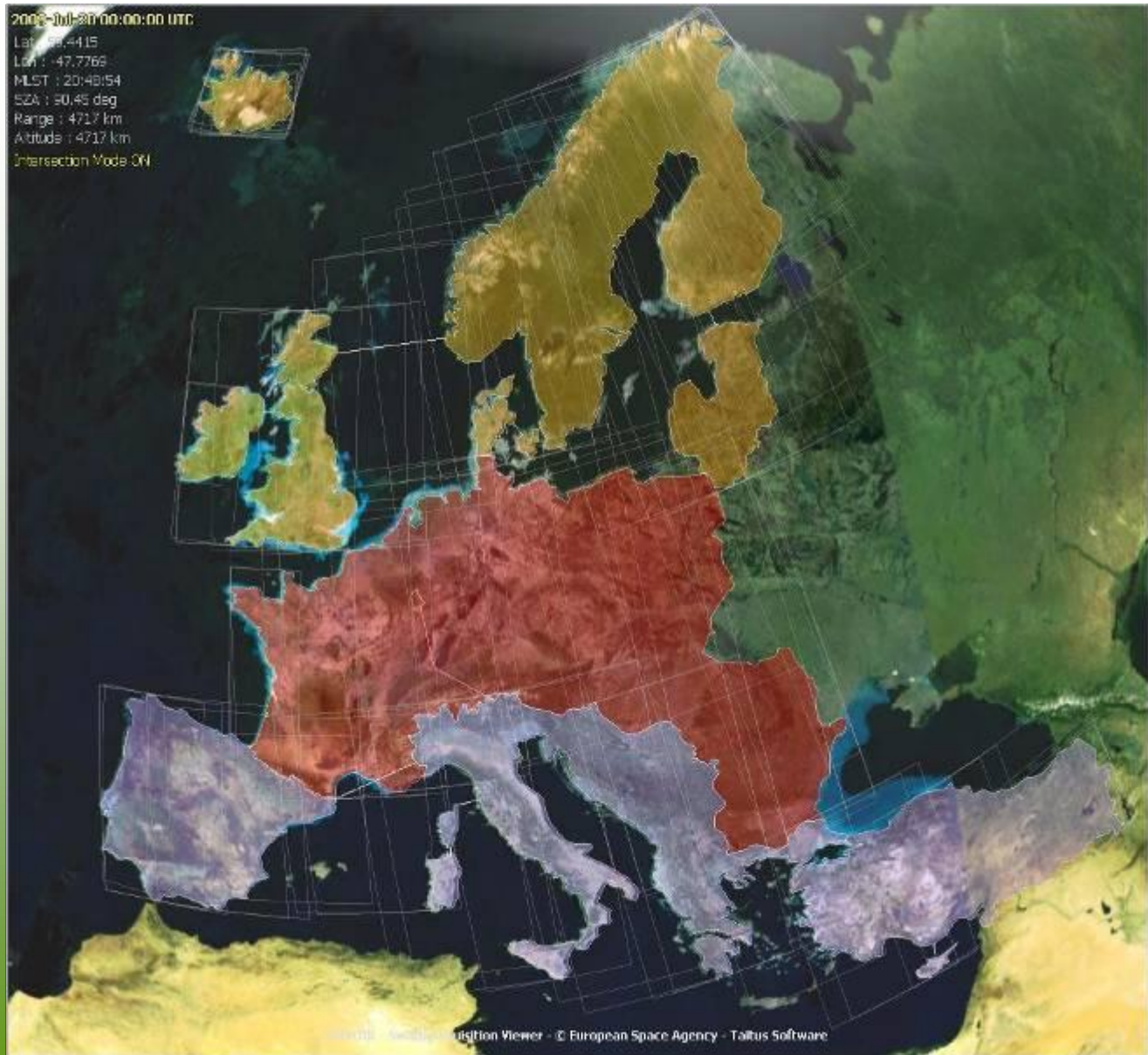


Resolution

22 m

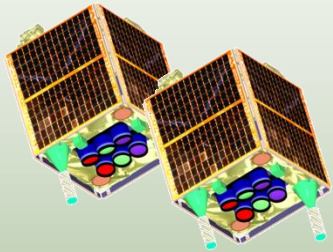
Day

0 of 5



Rapid Continental Coverage

Satellites



Resolution

22 m

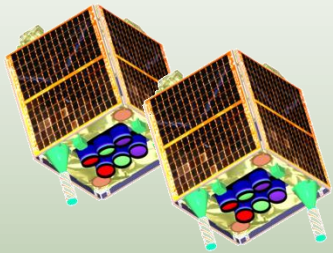
Day

1 of 5



Rapid Continental Coverage

Satellites

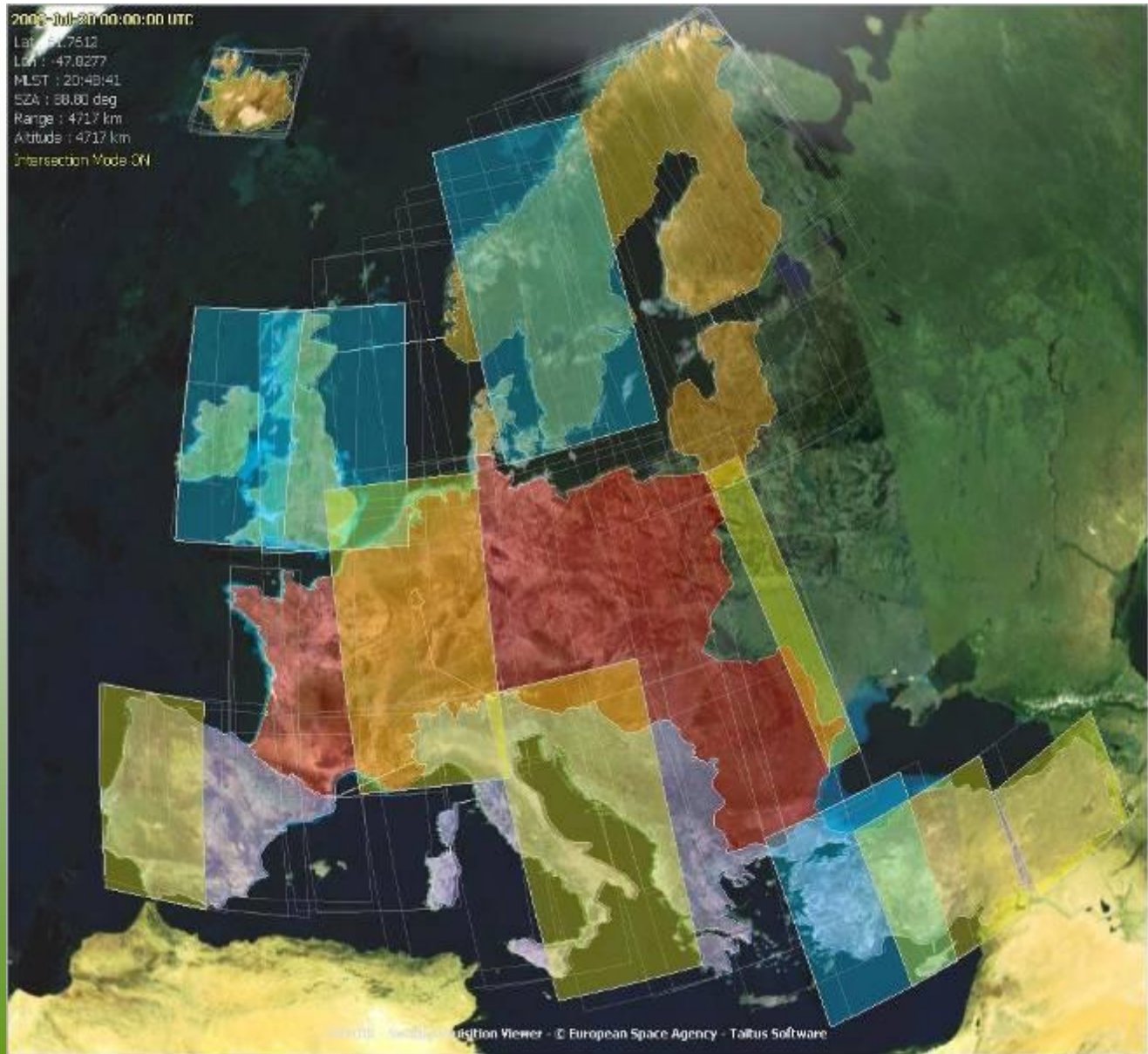


Resolution

22 m

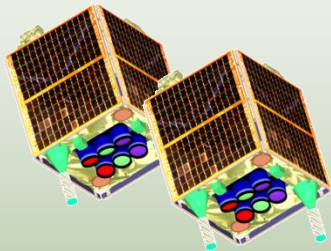
Day

2 of 5



Rapid Continental Coverage

Satellites

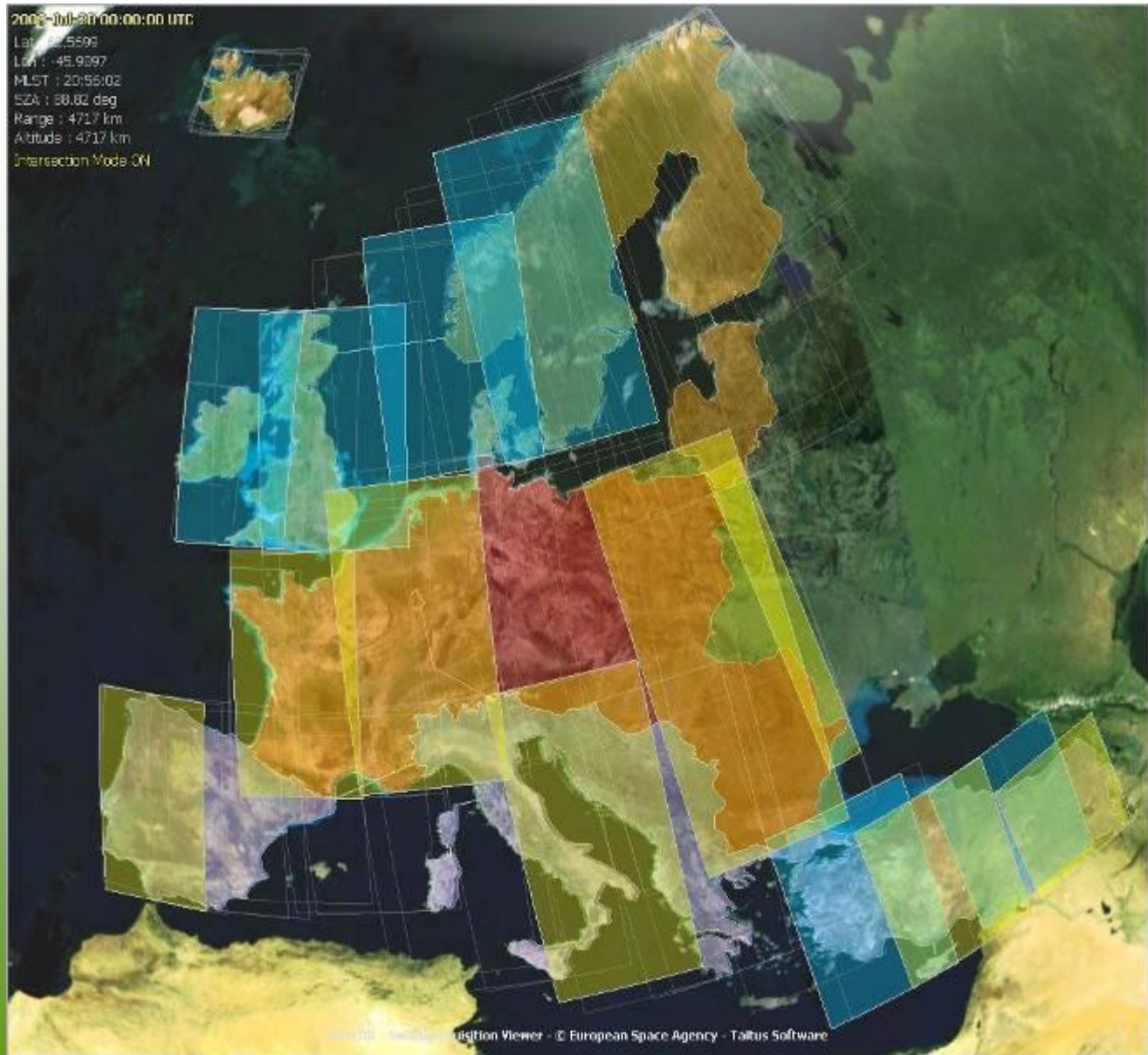


Resolution

22 m

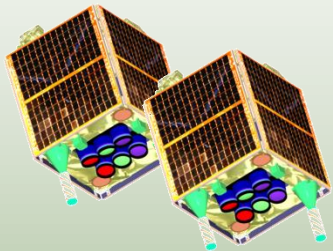
Day

3 of 5



Rapid Continental Coverage

Satellites

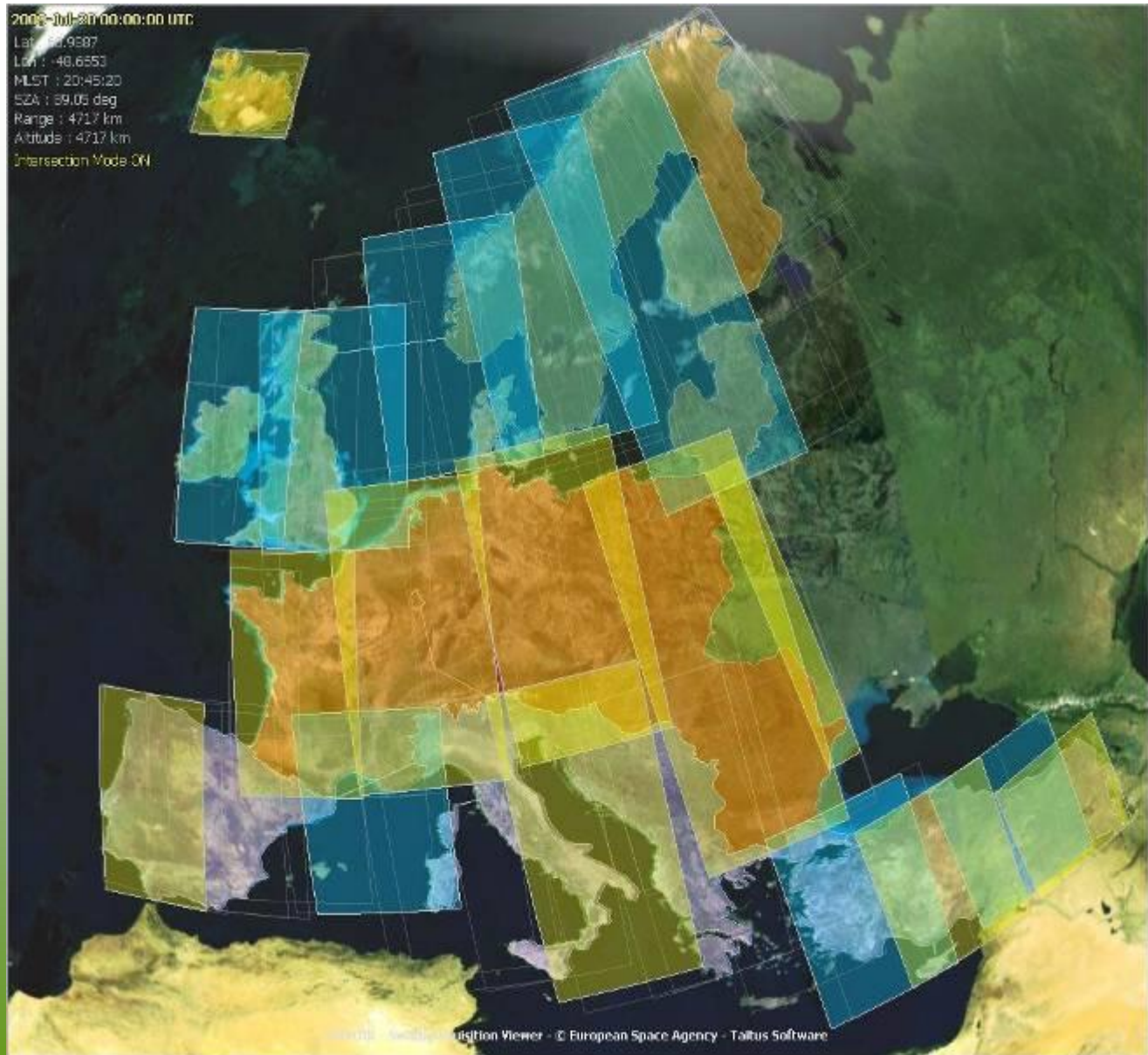


Resolution

22 m

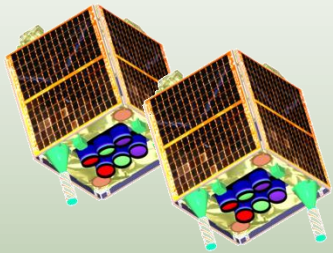
Day

4 of 5



Rapid Continental Coverage

Satellites

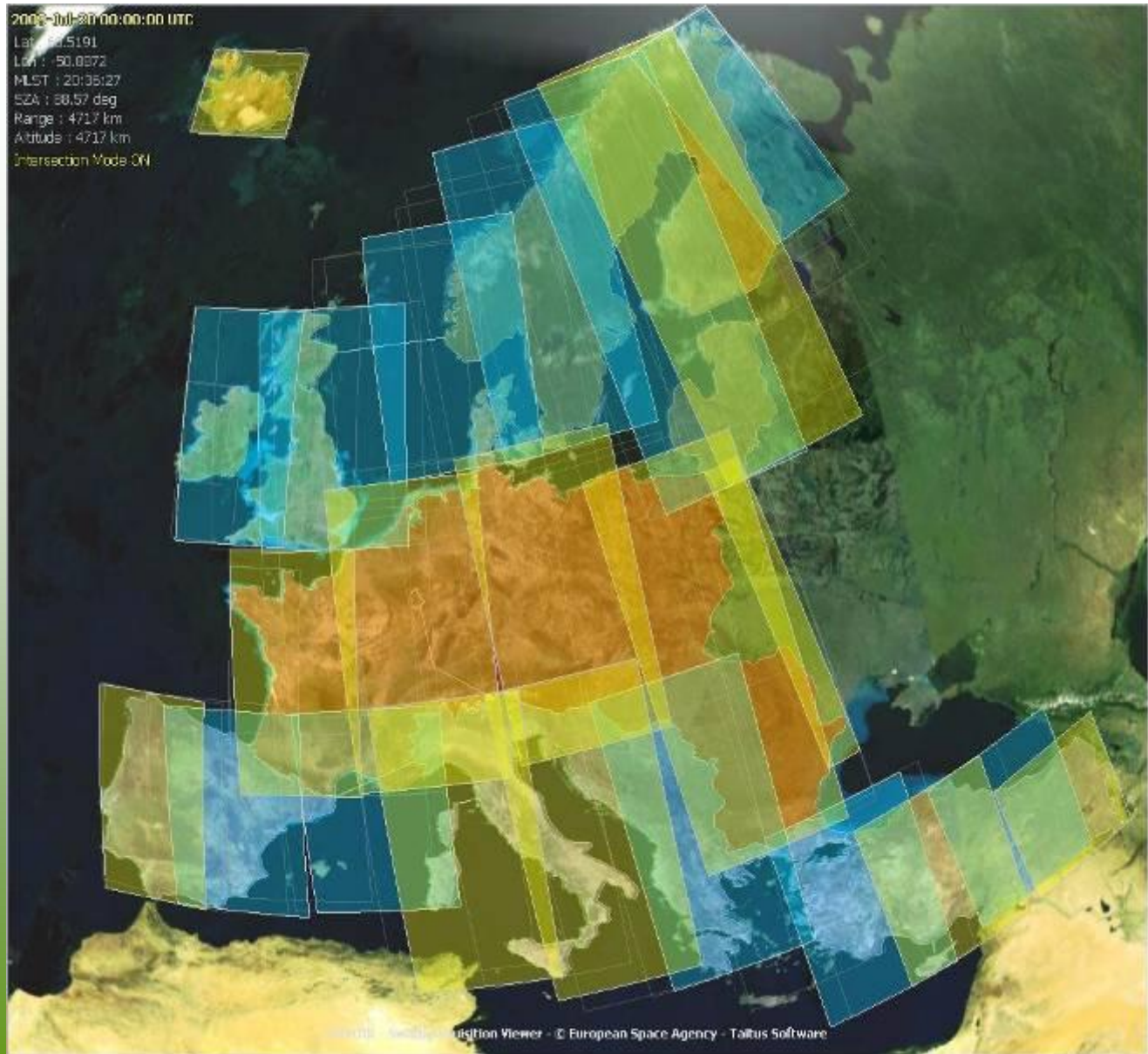


Resolution

22 m

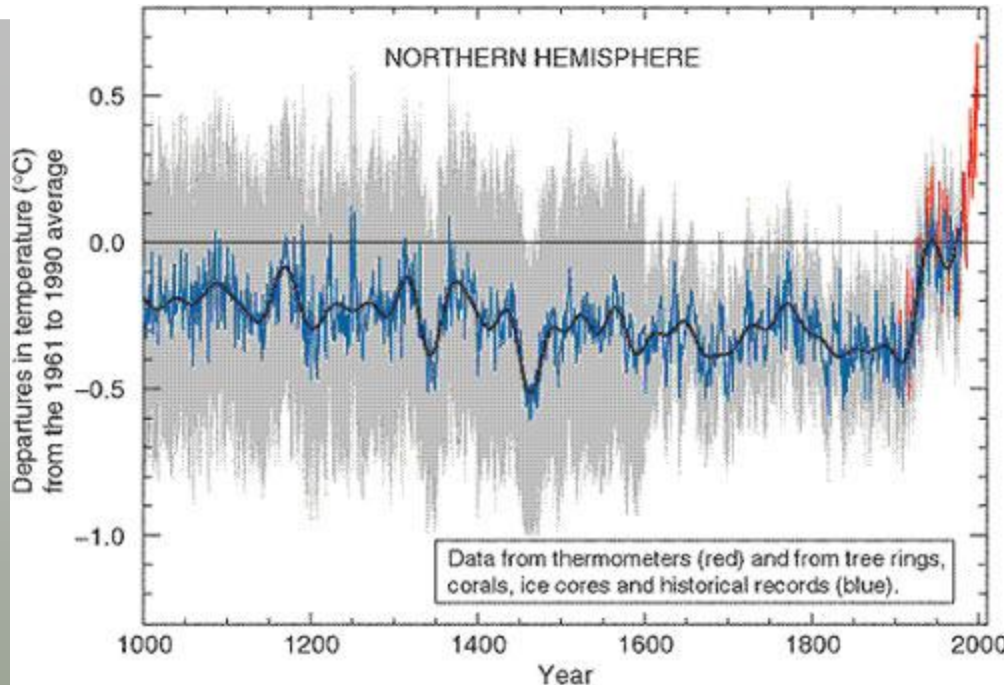
Day

5 of 5



Tropical Forest Monitoring

Climate change & Tropical forests



- Greenhouse gas emissions appear to be changing climate.
- **Deforestation** may be responsible for 20% of anthropogenic CO₂ output. (IPCC)
- Regional potential to conserve and sequester carbon
 - Tropics (80% of total),
 - Temperate (17%),
 - Boreal zones (3%).



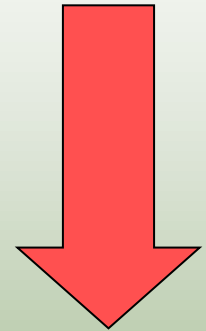
Deforestation & climate change

- The United Nations Framework Convention on Climate Change (UNFCCC)
Reducing Emissions through Deforestation and Degradation in developing countries (REDD+) program
 - Plan to pay nations to preserve tropical forest
- Requires reliable regular monitoring
 - Management by governments
 - Verification by funding agencies
- Satellites essential to monitor change

Deforestation & climate change

- What can be measured?
 - Deforestation - Clear cuts
 - Reforestation/ agroforestry
 - Degradation – selective logging
 - Biomass change
 - Carbon stock and carbon flux

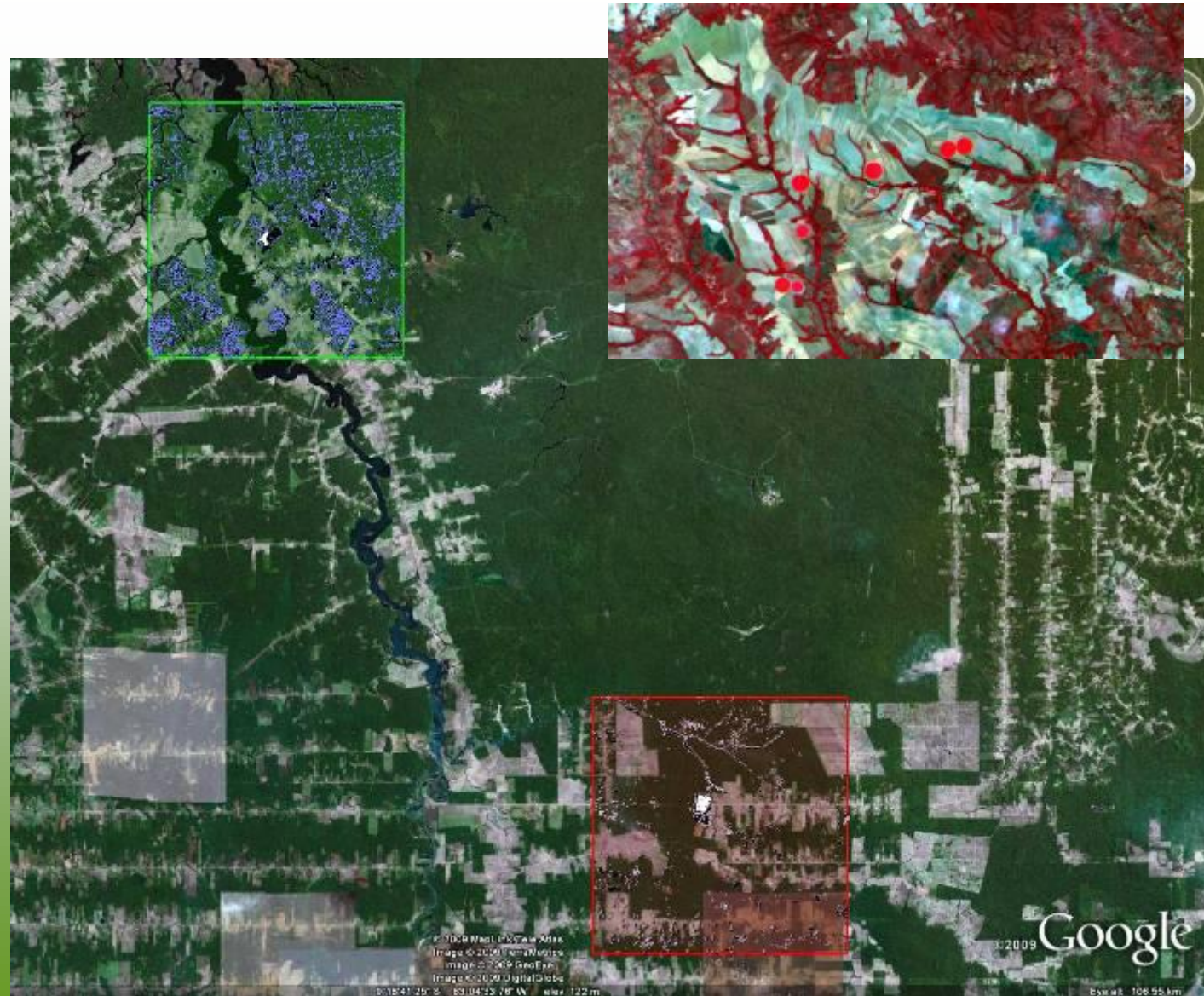
EASY



HARD

Forest Monitoring

- Forest / Non-Forest
- Clear Cuts
- Change detection
- Logging roads
- Area Classification
 - Palm Oil
 - Agriculture
- Standing water



Indonesia: Forest Area Classification Map

Thematic Content:

- Basic Landcover

Scale:

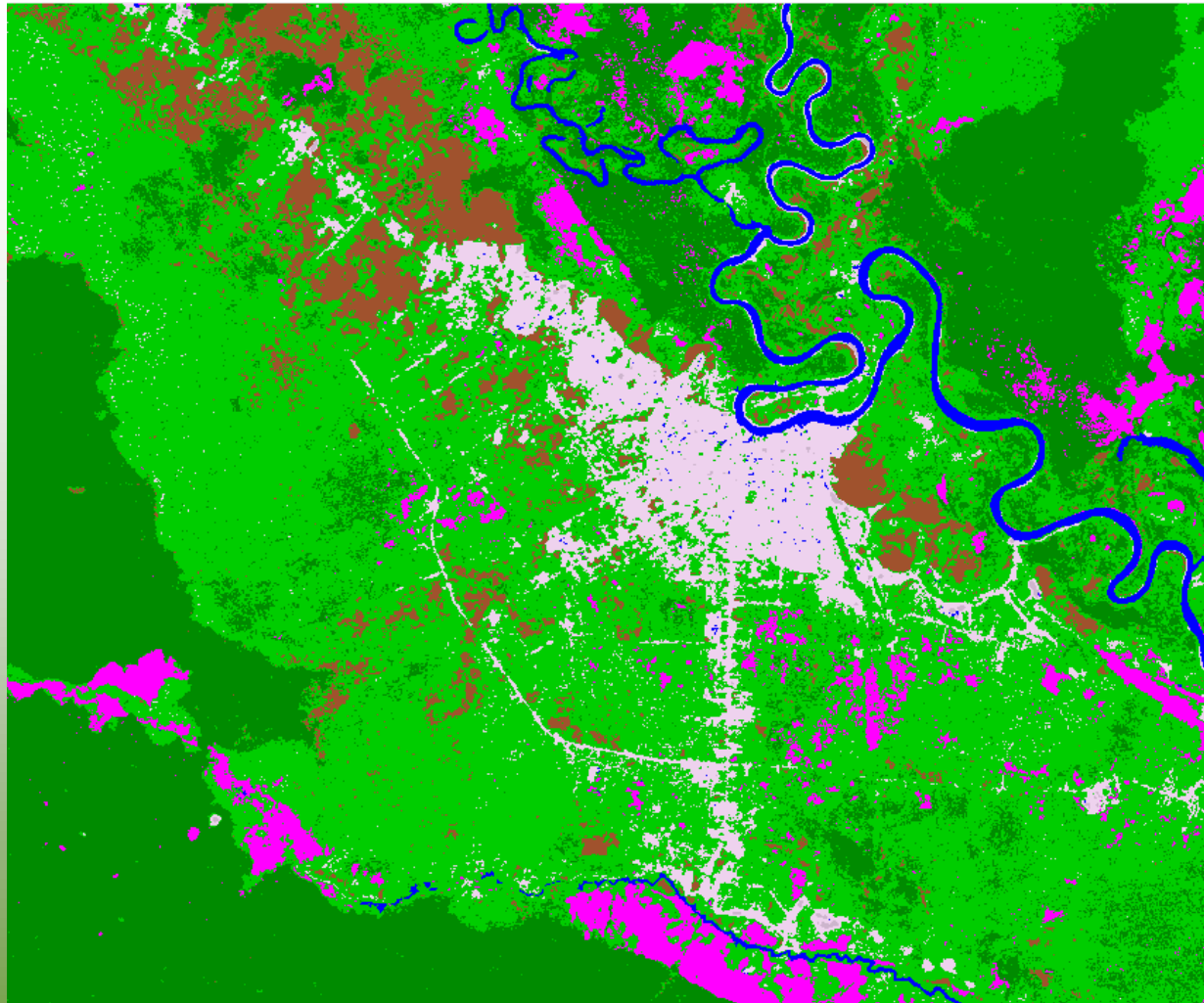
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Projection/Ref:

- UTM WGS84

Format:

- GeoTiff
- ERDAS.img
- ENVI
- PDF
- KML/KMZ



Indonesia: Forest Change Indicator Map

Thematic Content:

- Degradation
- Re-growth
- Burnt area
- Flooded area

Scale:

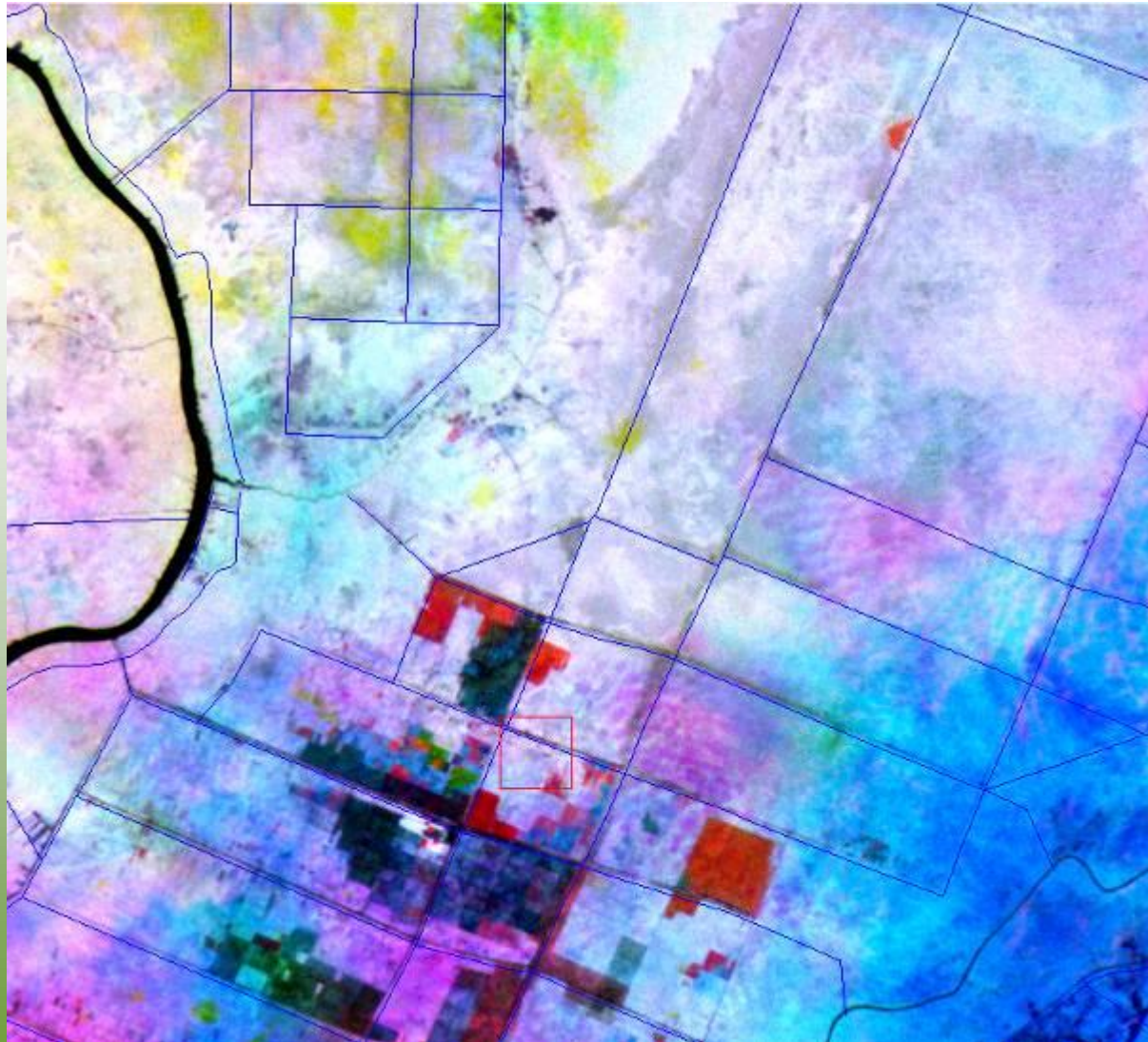
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Projection/Ref:

- UTM WGS84

Format:

- GeoTiff
- ERDAS.img
- ENVI
- PDF



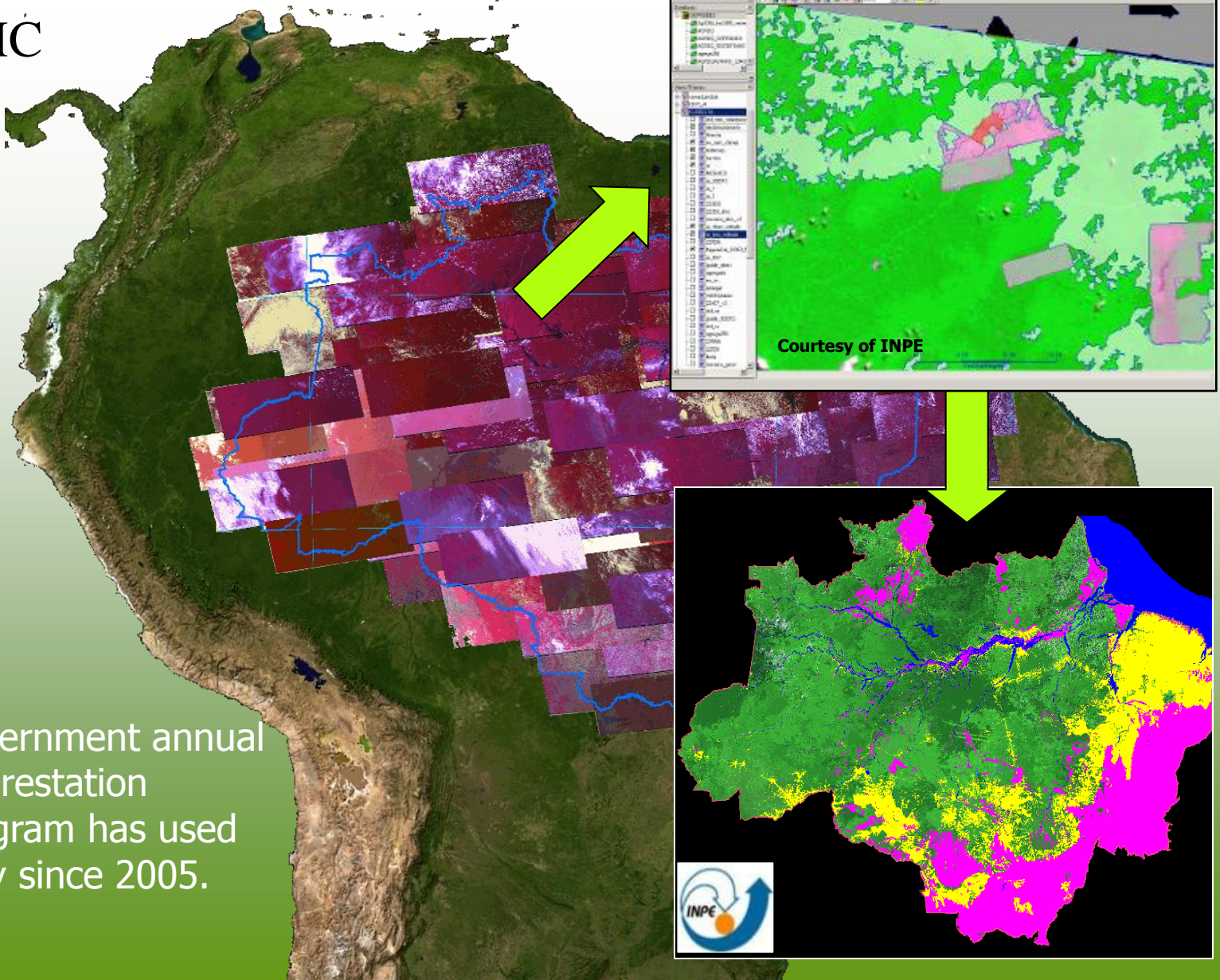
Multi-temporal NDVI Composite (3 Dates)

Forestry – National Reporting

Annual DMC
campaigns:

- 2005
- 2006
- 2007
- 2008
- 2009

Brazilian Government annual
Amazon deforestation
PRODES program has used
DMC imagery since 2005.

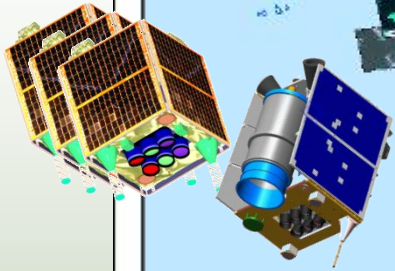


Central Africa

- Remote sensing and forest inventory programmes in Central Africa have produced comprehensive historical high quality records (CARPE)
 - Highly accurate surveys are necessary for biomass/carbon flux, these take time and effort
- **High frequency satellite surveys for operational monitoring are required**
 - After 1 year, degradation is difficult to detect
 - Enforcement needs information to **target** ground surveys
- Countries without operational forest monitoring programmes will be refused entry to the REDD-Plus process

Africa Coverage

32 & 22 m



- DMCii is supported by the EC-GMES to collect imagery in 12 months 2009/2010
- The EC-GMES state that the coverage is a 'core dataset' also for the 2011/2012 period



Quicklook Map

Annual monitoring of Congo Basin Forests

High frequency monitoring to
identify annual forest change

Reliable regular information for
sustainable forest monitoring

DMC
650km swath
3 satellites @
22metres gsd
3 satellites @
32metres gsd

0 150 300 450 Km

Lisala, D.R. Congo

Congo River

22m detail from UK-DMC2 image

Operational Imaging Services

DMCii coordinates DMC Constellation to deliver

On-demand rapid imaging

- Fast responsive imaging service
 - 2.8 and 4 metre panchromatic
 - 5.6 metre multispectral
 - 32 metre multispectral
 - 22 metre multispectral
- New sensors
 - 2.5 metre pan / 5 m multispectral (2010)

Country / regional mapping

- Multi-season coverage

Precision Agriculture

- Flexible, short imaging windows to cover large or small Aols

Forest monitoring

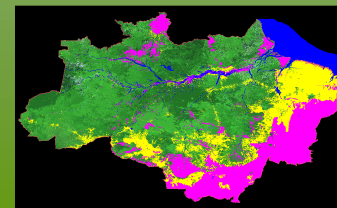
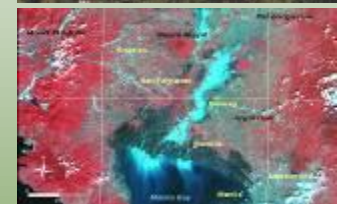
- Large area change detection and classification

Direct downlink near real-time imaging

- 22 metre multispectral

On-line Archive access

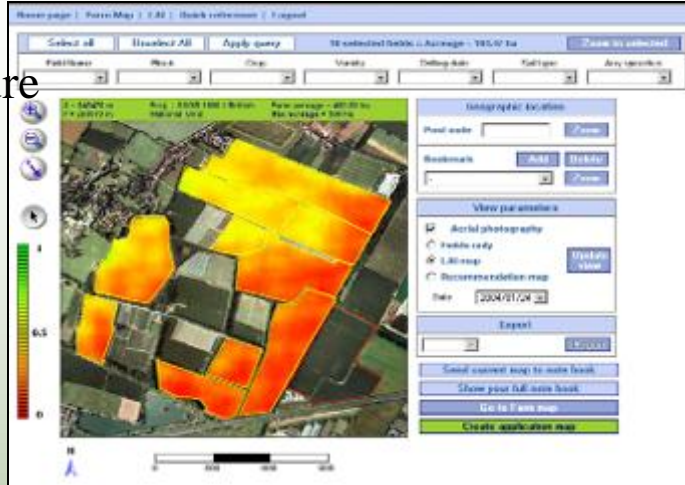
Training



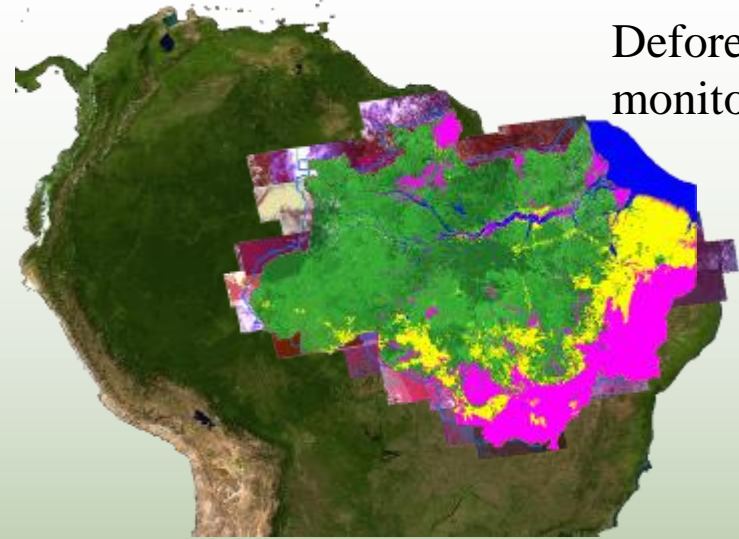
Applications of DMC imagery

Benefits of rapid revisit and wide area coverage

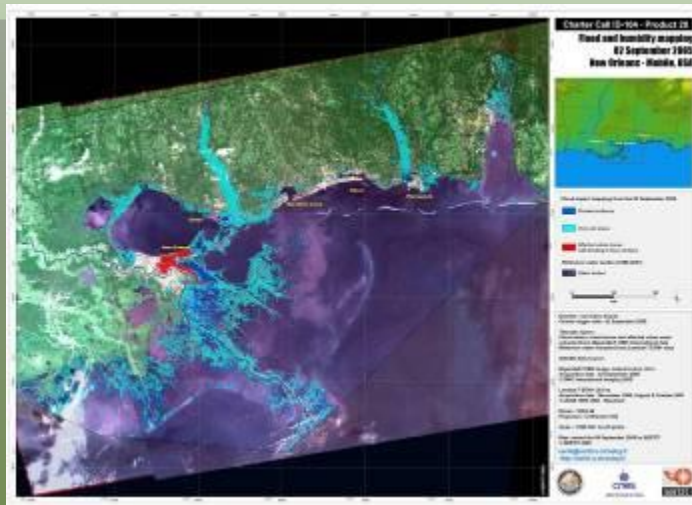
Precision
Agriculture



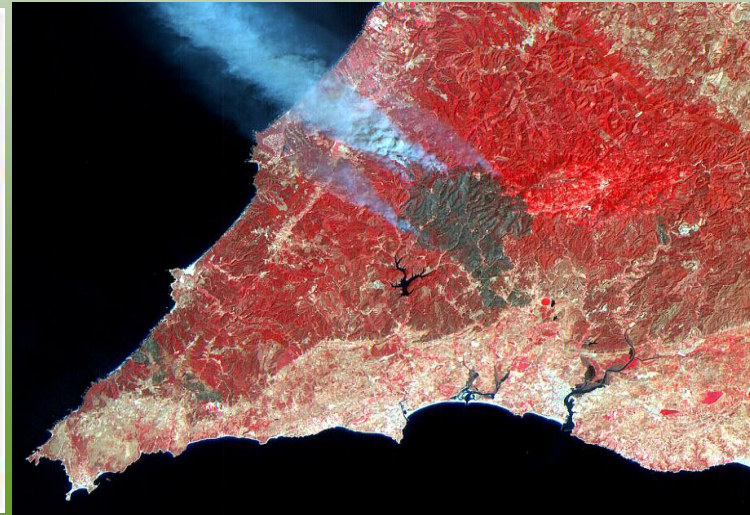
Deforestation
monitoring



Flood
mapping



Burnt Area
mapping



Agriculture – Precision Farming

Online Agricultural services - Field level monitoring of crop health...



DMC 32m data located over 5m aerial photo in UK

Illicit crop monitoring - Afghanistan

Annual DMC campaigns:

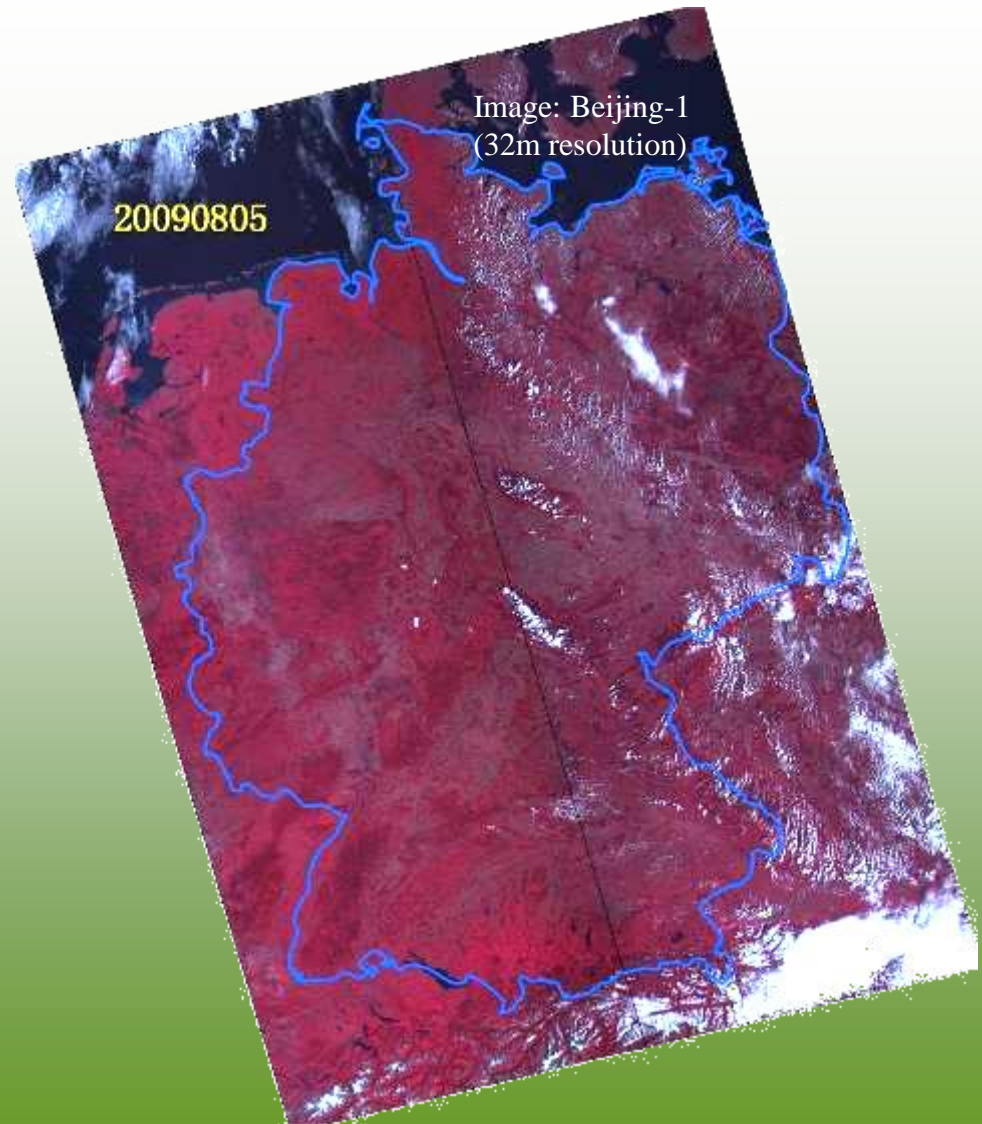
- 2005
- 2006
- 2007
- 2008
- 2009

- Annual opium crop production monitoring
- Intensive annual campaign
- Part of a multi-sensor approach for UK Foreign Office & UNODC
- Specific narrow windows in April/May for each province

UNODC report 2009: Cultivation down from 193,000Ha (2008) to 123,000Ha (2009)

Germany - land cover mapping

- German government national land cover mapping project, 2009
- Prime contractor: Infoterra GmbH
- Data sources = DMC (2 windows) + Rapideye (1 window)
- Both DMC windows completed 95% cloud-free



Monitoring Europe; Working with GMES

Delivered

- Single year
- 38 countries
- 5.8 million km²
- <5% cloud
- 32 metre gsd



Constellation benefits

- Global daily revisit
 - operational monitoring of rapid change
- Coordinated imaging
 - powerful for multiple applications
- Centralised calibration campaigns
 - Consistent high quality data
- Modular addition of new satellites
 - Data continuity
 - Benefit from latest technology
 - increased capacity
 - new sensors

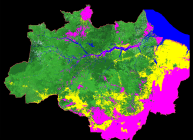
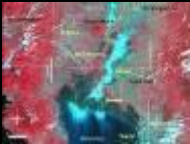
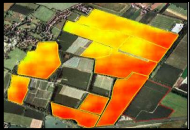
Thank you!

www.dmcii.com

info@dmcii.com



Get DMCii
data
through
USGS or
USDA



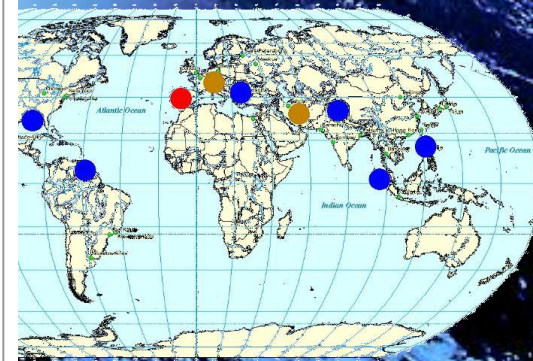
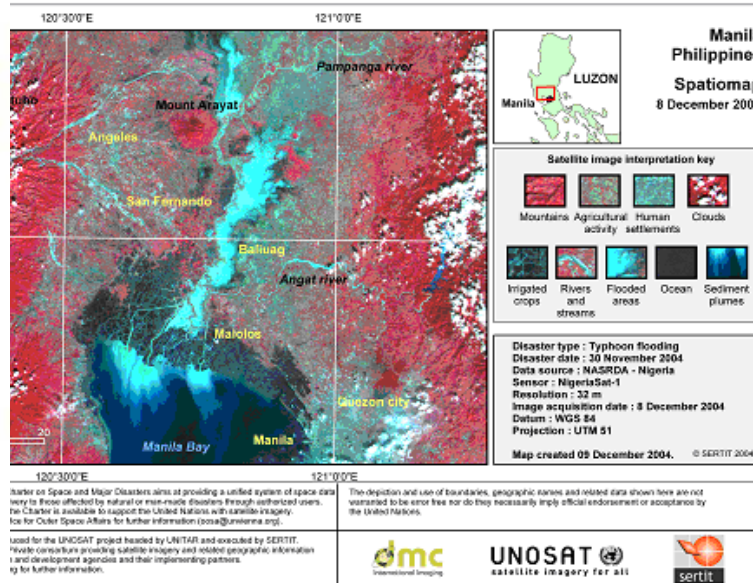
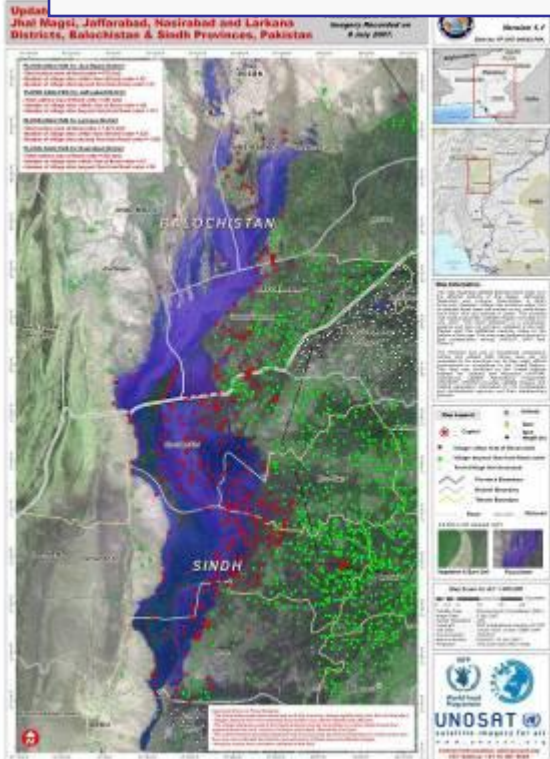
DMC Disaster Response

DMC's role in International Charter; Space & Major Disasters.

- Rapid response Imagery
- Emergency On Call Officers
- Executive Secretariat chair; Oct'07- Apr'08
- Charter Board chair; Oct'07- Apr'08



UK Charter Board Member



DMC Disaster Response